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Construction of Active Learning Environment by the Student Project

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Abstract

Recent year, Active Learning is being introduced for education field, and learning style is change from passive learning to participatory type.

Active learning(AL) is a lecture which students learn knowledge by active. The introduction of ICT equipment isn't indispensable to promotion of AL, but when sharing of knowledge is considered, it'll be effective in the future to maintain. Usually the classroom consist of static desk and chair. So it difficult to change the arrangement learning environment. A teacher stands in front of the classroom, and gives them a lecture, Students are the style that sits down. It's the problem that maintenance of the environment is important to perform the lecture of the active learning style into effect efficiently. Improvement of the environment is needed for us to put the lecture of the AL type into effect. For example installation of a white board and a projector. Such learning environment should be offered with priority. But time and the cost of the money will be a problem in this implementation. We did for improvement of the learning environment, and were low in cost, and worked on the problem solving performed by a short time. We suggest that we corporate with students to produce to their AL classroom. Work of environmental improvement is PBL for a student. This improved student's motivation. Students proposed newly during a this PBL. It was possible to be that we suppose PBL as classroom maintenance and work on PBL as well as students.

In this paper, we gathered activity with this as PBL. We introduced a usage example in the maintained classroom. We're convinced that this paper is useful for maintenance in the future's AL classroom.

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Keywords: Active Learning (AL), Active Learning Environment, Problem/Project Based Learning,ICT equipment

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1. Background

In recent years, a qualitative change of the education from the passive learning which is a one-sided lecture by teachers to the active learning, which is adopted the participatory learning, is required [1,2].

National Institute of Technology specify that "Active learning (e.g. PBL) will be increased in every subject …" as a one of the vision, moreover the active learning (AL) is promoting in the whole National Institute of Technology [1].

An introduction of ICT equipment for promoting AL is not essential, but it will be effective in the future to install it so as to share information (e.g.Teaching material delivery).

In addition, in order to conduct the group work, the flexibility in typical classroom until now is low (e.g. an arrangement of a desk and a blackboard). Therefore, it is the important issue that the environment for learning is improved and the equipment which is easy to move and arrange, is prepared.

The provision of environment for learning should be improved at all times, however it takes time and money to do that. We consider whether the cost and time of that is able to be reduced. In addition, we presume the increase of student's motivation because students will improve, think and construct the environment themselves. Besides, we expect that new ideas will be fostered during the environmental construction, and it will be effective as a PBL (Problem Based learning).

In this paper, its construction is shown as follows.1. Initiatives toward AL in NIT Sendai, 2. Improvement of classroom corresponding to AL so far, 3. Improvement of classroom corresponding to AL by its own people, (1) Making a white board in classroom by students, (2) Installation of projector by cooperating with technical officials, 4. Maintenance of AL-type education system with students, (1) Installation of desk and chair corresponding to AL, (2) Application of pasting whiteboard into wall, 5. Construction of common space, 6. Implementation Status in AL-type education system, 7. As for costs

2. Initiative to AL by Sendai technical college

Our college purpose is build and practice an education system with the next generation type which like AL. We introduce AL by focusing on the AP(Acceleration Program for University Rebuilding) [2]. So, construction of effective learning systems including AL has been lacking, and there is a particular need for systematic education systems, including project/problem-based learning (PBL) and mastery learning (ML), in the field of computing education. We proposed an advanced active autonomous learning system (A^3 learning system), a new educational system based on ICT devices such as computers[3]. Our A^3 learning system contains AL, PBL[4,5,6] and ML[7,8,9,10,11]. This is a departure from legacy-based courses that involve cramming in a fixed quantity of knowledge and achieves a progressive form of learning in which the learning size changes actively and autonomously to fit the objective achievement level corresponding to individual students.

2.1. Maintenance of classroom corresponding to AL by the conventional method

As an infrastructure development in order to promote active learning, active learning / PBL classroom, the acceleration of ICT in conventional classroom, maintenance of a wireless LAN, and overhaul of streaming server in college were conducted. Here, we demonstrate about active learning / PBL classroom and the acceleration of ICT in conventional classroom.

(a) Active learning /PBL class room

In an active learning classroom, we installed the desk and the chair with caster or light appliance so that a diverse group work, presentation and lecture could be done. In addition, in order to share information in group work, the whiteboard and the projector in every groups were introduced. In some classroom, the wall for sharing information is able to be used since the wall was papered by the whiteboard.

Two active learning classrooms were installed in Hirose campus by a revised budget in 2013, it was also installed in Natori campus by expense for the AP project. Fig.1 shows the active learning classroom. In this classroom, desks with caster (for each individual), chairs with caster and ten movable whiteboards for the group work were provided.

(b) Acceleration of ICT in conventional classroom

In order to promote the ICT education system in conventional classroom, Acceleration of ICT was conducted. Fig.2 illustrates the system of that. The system is consist of a short focus projector, a document camera, an auxiliary desk, and a slide-type whiteboard.

An image of short focus projector is projected to the whiteboard. Thereby, we could add an additional explanation on the projected image. A document camera and a laptop is put on an auxiliary desk. Additionally, a cable from the projector is stowed in the auxiliary desk.

In the classroom which was not able to install this system, an installation of projector and an application of the whiteboard were carried out by a student project and technical officials.

Figure.1 Active learning room

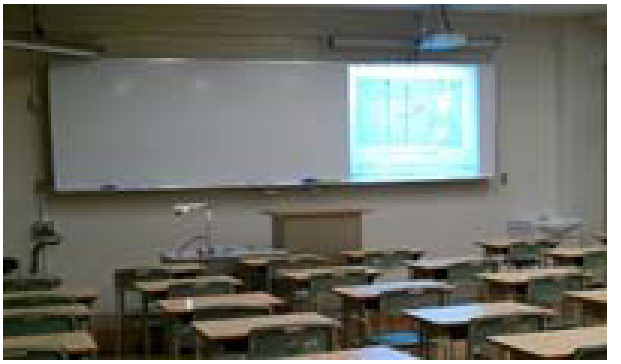

Figure.2 The ICT environment of the classroom

3. Improvement of classroom corresponding to AL by its own people

In a maintenance of an AL classroom so far, it was difficult to raise cost and adjust a work execution period. Therefore, the environmental construction was done by teachers and students.

(a) Making a white board in classroom by student project

It is effective to use a projector so as to carry out an AL-type education by utilizing ICT. It is also important to introduce the whiteboard for conducting efficiency a class. It normally takes a couple of days before a change of blackboard. Entrusting to a dealer takes a lot of cost. As a student project, we sought students who would like to participate in the environmental construction in the classroom. In consequence, 10 students gathered. In the execution, it is relatively easy that the whiteboard was stuck onto the blackboard. Students confirm a sample and a usage on the web of the selling agency. They examined a schedule, a necessary tool, and a procedure of the construction. Especially, they considered about how to stick the whiteboard on the blackboard, a temporary fixing, and the way of removing a release paper. They speculate keeping a state of tension for doing the task as shown in Fig.3. This is due to the PDCA cycle for improving a work, which was conducted before working and during that. The PDCA (plan-do-check-act) cycle is well-known as a typical management cycle. In same project, other three rooms were constructed as well. They figured out becoming better than the classroom which is made first, not to make a wrinkle and a scratch. Fig.4 displays students were beginning to paste the whiteboard from the middle of blackboard.

Students participated in this project for the first time. Therefore they planned participate to attach the white board sheet well (Plan1). As a result, they attach that sheet from the one end (Do1), after the way to install that sheet temporarily once was done. How to attach the sheet was considered after an end (Check1). After it was investigated, attach from the center was proposed (Action1 & Plan2). They considered how to spread after the building of the whole white board sheet (Check1). After they were considered and investigated for next time, so they attach the sheet from the center was proposed (Action1 & Plan2). As a result, they could reduce working hours and attach that sheet beautifully. They discussed whether there weren't other ways. As a result, they judged that this way was best (Check2).

They also attach that sheet on a remaining classroom by the same way (Action2). Students reached efficient work by the PDCA cycle learned in the lecture by the process.It appears that PDCA cycle is effectively.

Fig3. Making a white board in classroom1

Fig4. Making a white board in classroom 2

(b) Installation of projector by cooperating with technical officials

Because of making the white board in a classroom, it became easy to reflect the image onto a screen. Thus, we proceeded with setting up more projectors. That installation was conducted by cooperating with technical officials, because it takes a lot of costs if we request the company. We prepared the projector, and some wirings (HDMI, RCA, Mini-plug, Power Line). They were fixed as shown in Fig.5 and Fig.6.

We built four classrooms which were not finished applying ICT. A document camera was installed on desk as indicated in Fig.7.

Fig.5 Installation of projector

Fig.6 Adjust of projector

Fig.7 installation of document camera

4. Maintenance of AL-type education system with students

(a)Installation of chair and desk of corresponding to AL

We advanced the application of ICT in existing classroom so as to encourage the AL-type class. Student's motivation was increased since a part of students were cooperating the environmental construction. In addition, the decrease of costs and the immediate effect were able to be appreciated.

The maintenance of the AL classroom which is easy to do the group discussion and the pair work is a big issue. Maintaining the classroom with students is including an aspect of PBL and able to be shorten the time. Fig.8 and Fig.9 show the appearance of the work. They were discussing the work procedures and the idea to improve efficiency.

Fig.8 Assembly of desk

Fig.9 Transfer of desk

(b) Application of sticking whiteboard into wall

In order to conduct efficiently the AL-type lesson, pasting the whiteboard into the wall was done by students. The whiteboard has already been cut depends on where. We made some groups of approximately five students. We explained only basic things, after that, we had students discussed in group member. Repeating the PDCA cycle is needed for doing a task. In addition, the meeting in each groups and an opinion of mutual agreement are also needed. This project is an activity including an aspect of PBL which is different from the lecture for acquiring knowledge. Many students feel a pleasant doing maintain the classroom themselves. However some students were not willing to cooperate.

Fig.10 Pasting whiteboard into wall

5. Implementation Status in AL-type education system

We report the application example of class that is compatible with the AL. It shows Fig.11. Each group discusses by making use of movable tables. It became easy to discuss in group because of the overhaul of classrooms. Fig.12 illustrates the look of class that is using a classroom in shown Fig.10. Some students were debating by using a whiteboard on the wall. It shows they put gather an opinion by brainstorming using a KJ method with a label. Fig.13 demonstrates the look of a presentation by students. Conventional lecture could be conducted in AL classroom as well. Fig.14 and Fig.15 shows an AL-type lesson against a first-year student, and a look of doing the group work. Although whiteboard has not been pasted on wall, it is able to project on a wall as shown in Fig.16 shows the appearance of doing the discussion after they moved a common space.

Fig.11 Group work in AL room

Fig.12 Discussion using the wall

Fig.13 Presentation in classroom

Fig.14 Introduction of AL to first-year student 1

Fig.15 Introduction of AL to first-year student 2

Fig.16 Common learning space

6. As for costs

We had requested the company to maintain the classroom of corresponding to an AL-type education. The total including a change of whiteboard, an installation of projector, some cables, a document camera, and two workers is 3,000,000 yen per a classroom. As a result of a student project, that costs decreased to 60,000 yen per a classroom. In addition, we don't need to mind a sabbatical leave because we are able to proceed with the work in the free time. In fact, when staffs installed a projector, it takes 2 hour per 4 rooms. Pasting a whiteboard by approximately 8 students took 1.5 hour per a room.

Some unique ideas were proposed by students since students produced a setting for learning. Fig.17 shows an application of sticking whiteboard on all over the wall. Furthermore, an application of pasting a sheet on a table is done as shown in Fig.18.

Fig.17 Application of sticking whiteboard on all over the wall

Fig.18 Application of pasting a sheet on a table

7. Conclusion

In this paper, we stated an environment establishment for AL and an application example. Constructing a setting for AL became abele to do quickly and be a decrease of cost because of cooperating with student project and technical officials. As a result, it became able to provide the learning commons.

In addition, we could adopt some new ideas which were generated by student while students were improving the classroom.

By means of a PDCA cycle for solving a problem and an animated exchange of opinions in each group, it appears that students were developed.

In this time, although an innovative idea were not proposed due to the directions (e.g. the position of whiteboard) by teacher, the interesting idea might be suggested if teachers don't instruct.

From now on, regarding an environmental construction for AL, with adopting as a process of solving a problem, it confirmed that students are actively able to work on. It is significant to resolve the problem by making the most of an idea without a specialized knowledge (e.g. software development). In addition, although it is demand to educate so that the rivalry is suppressed, it is effective for student's motivation that everyone could share things which is approaching completion.

We would work on an environmental construction in a college with students..

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